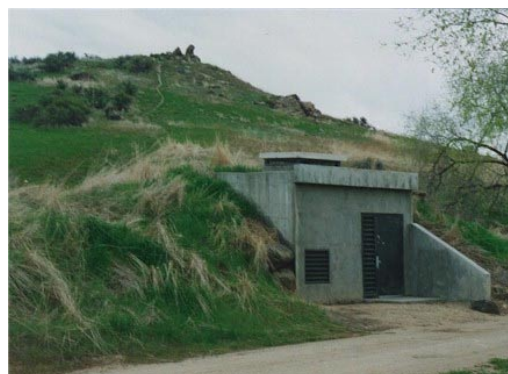


RENEWABLES SECTOR: GEOTHERMAL DISTRICT HEATING

◆ IDAHO

Using Geothermal Energy to Provide Heat and Hot Water

Idaho has a long tradition of using the Earth's natural heat energy to provide heat and hot water to its residents. The tradition started in 1892, when the Boise Water Works built the first wooden pipe-lines for drawing water from drilled wells at the nearby hot springs. Over the years, the system has gone through numerous changes, but the modern day Boise Warm Springs Water District System is a direct descendent of the 1892 system.



The City of Boise, the Boise Capitol Mall Complex, and the Fort Boise Veteran's Hospital all installed geothermal heating systems in the early 1980s. Following the energy crisis of the mid-1970s, geothermal heating had become an increasingly attractive option. This increased use placed unprecedented demands on the geothermal reservoirs causing water levels to decline rapidly. To protect and maintain the region's geothermal resources, the Idaho Department of Water Resources (IDWR) created the Boise Front Low Temperature Geothermal Resource Ground Water Management Area (one of several ground water management areas in the state). By using injection wells (where expended water is returned to the reservoir rather than disposed of in the Boise River) and barring further geothermal projects in the vicinity, the IDWR has ensured that geothermal heating will continue to play a role in Idaho's future energy use.

Results:

Each of the four geothermal projects in the management area replaces traditional energy generation with virtually zero-emission geothermal energy. If each of the buildings associated with the four projects used electric heat, an additional 50.4 GWh of electricity would be needed, causing almost 27,500 metric tons of CO₂ (7,500 MTCE*) to be emitted. If the buildings used natural gas heating (a less carbon-intensive approach), about 180 million cubic feet of natural gas would be consumed annually. Burning this much natural gas would release over 9,000 metric tons of CO₂ (2,470 MTCE**).

Energy Savings	Annual Cost Savings	Emissions Savings
172,100 mmBtu or 50.4 GWh	\$1 million	2,470 MTCE* to 7,500 MTCE** ^a

a The lower limit represents emissions if natural gas was used exclusively to heat the buildings. The upper limit represents emissions if electric heat was used exclusively.

Principal Actors:

The Idaho Department of Water Resources administers the Boise Low Temperature Geothermal Resource Ground Water Management Area. This Area contains four geothermal projects belonging to the City of Boise, the Fort Boise Veteran's Hospital, the Boise Capitol Mall Complex, and the Boise Warm Springs Water District.

Additional Information:

Kenneth Neely, Idaho Department of Water Resources, kneely@idwr.state.id.us; Idaho Department of Water Resources, 1301 N. Orchard St, Boise, Idaho, 83705, 208-327-7900, fax 208-327-7866.

This case study is based on information provided by Kenneth Neely, Idaho Department of Water Resources and from the Geo Heat Center web site for direct geothermal use in Idaho: <http://www.oit.osshe.edu/~geoheat/state/id/all.htm>.

*Original data have been converted from mmBtu (million Btu) to Metric Tons Carbon Equivalent (MTCE) using the following: 117.08 lbs CO₂/mmBtu and 31.61 lbs C/mmBtu (U.S. DOE/EIA, *Instructions for Form 1605: Voluntary Reporting of Greenhouse Gases*, 1998, Appendix B)

**Original data have been converted from GWh to Metric Tons of Carbon Equivalent (MTCE) using the following: 1.202 lbs CO₂/kWh (The Cadmus Group, Inc., *Regional Electricity Emissions Factors Final Report*, The Cadmus Group, Inc., 1998, Exhibit 6—Average Marginal Emission Factor for Electricity for Idaho)
1 metric ton=2,205 pounds, 1 metric ton CO₂=0.273 metric tons carbon equivalent (MTCE)